

Microanalysis and Nano-Characterization of Materials: Where should CINT go?

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Frederick Seitz Materials Research Laboratory (FSMRL)

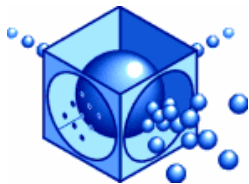
University of Illinois at Urbana-Champaign

Introductory Notes:

- The CMM in the FSMRL (<http://ntweb.mrl.uiuc.edu/cmm/>) is a great template for a User Facility.
- Many laboratories have been patterned after the CMM-FSMRL

Outline:

1. Brief description of the CMM-FSMRL, and why it is successful.
2. What YOU want to see in CINT
(open discussion / e-mail me: lhg@uiuc.edu).



Center for Microanalysis of Materials (CMM) Frederick Seitz Materials Research Laboratory (DoE - BES National User Facility)

An integrated facility with 24 hour access to qualified users.

No user fees for non-proprietary research regardless of funding source

1. Electron Microscopy

Transmission Electron Microscopy

Philips EM420

Philips CM12

Hitachi H9000

JEOL 4000EX*

Vacuum Generator HB501

JEOL 2010 F STEM/TEM

JEOL 2010 TEM

Scanning Electron Microscopy

SEM/Focused ion-beam microscopy

Hitachi S-4700

Zeiss 960/CL

Low Energy Electron Microscopy

IBM LEEM*

2. Ion-Beam Analysis

HV Van de Graaff

General Ionex Tandetron/XRD*

**in-situ science*

3. Surface Analysis

Cameca IMS 5f SIMS

PHI TRIFT III TOF SIMS

PHI 660 Auger

PHI 5400 XPS

Surface Science XPS*

Small-spot imaging XPS*

4. Scanning Probe Microscopy

Digital Instruments Dimension AFM

Digital Instruments MultiMode AFM

Omicron VT-UHV STM*

UHV-AFM*

Near-Field Scanning Optical Microscopy*

5. X-ray Scattering

Philips X'pert

Philips X'pert

Rigaku RU 200

Rigaku D-Max

Scintag Powder PAD-X

Energy Dispersive X-Ray Fluorescence

Small-angle X-ray scattering*



Frederick Seitz Materials Research Laboratory (Outside the CMM)

Synchrotron Beamlines

UNICAT at Advanced Photon
Source/ANL

Sector 33 Insertion Device
Beamline

Sector 33 Bending Magnet
Beamline for XAFS

Sector 34 Insertion Device
Beamline

Brookhaven NL

X16A *in-situ* UHV treatments

X16C kappa diffractometer

Laser Facility

Absorption/Transmission
Spectroscopy

Brillouin Spectroscopy

Photoluminescence

Raman Spectroscopy

Time-resolved fluorescence

Ellipsometry

*Magnetic Characterization Facility
(SQUID)*

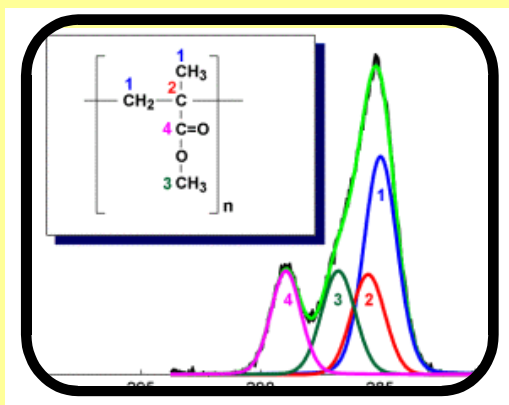
MPMS system and PPMS system
($T=1.9 - 800$ K; ac or dc $B < 7$ T.)

Hall effect (T and B dependent)

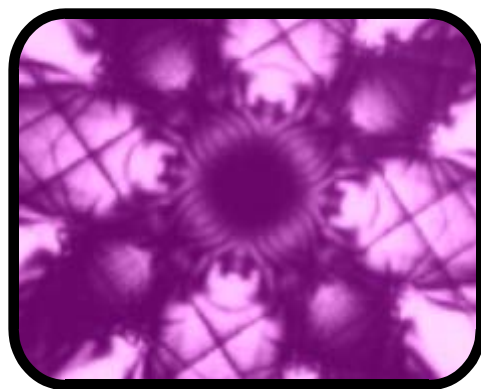
Center for Microanalysis of Materials (CMM)

National User Center for Electron-Beam Microcharacterization
Division of Materials Sciences, United States Department of Energy

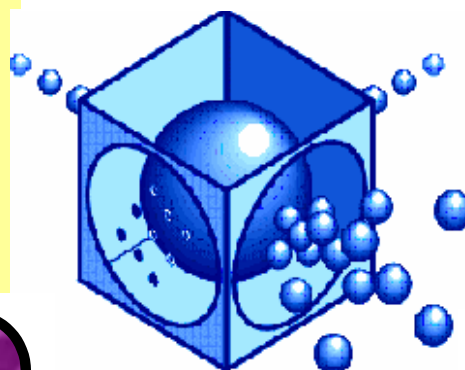
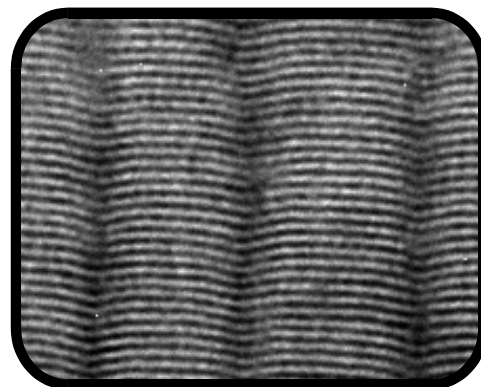
Characterization



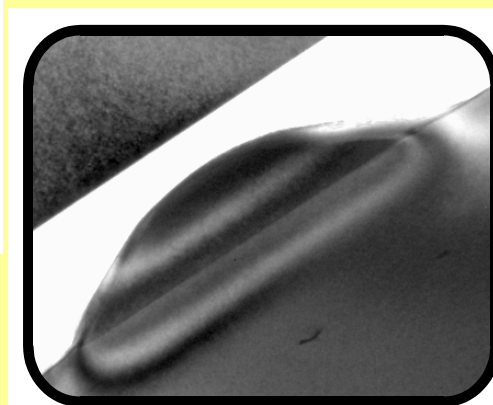
Spectroscopy



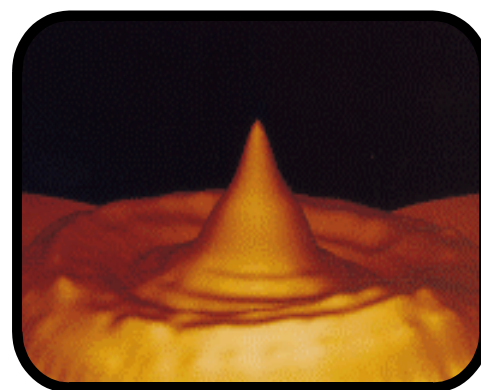
Crystallography



Imaging



Diffraction



Why use the Center for Microanalysis of Materials? (we ask this about CINT at the end)

➤ Versatility:

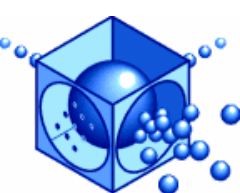
Broad spectrum of advanced analytical instrumentation and techniques.

➤ Expertise and Flexibility:

Staff are experts in techniques and in education / training. Scientists can learn to use facilities on their own, or in collaboration with a staff member.

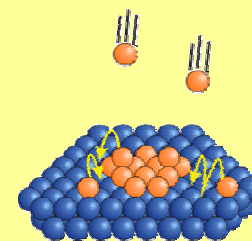
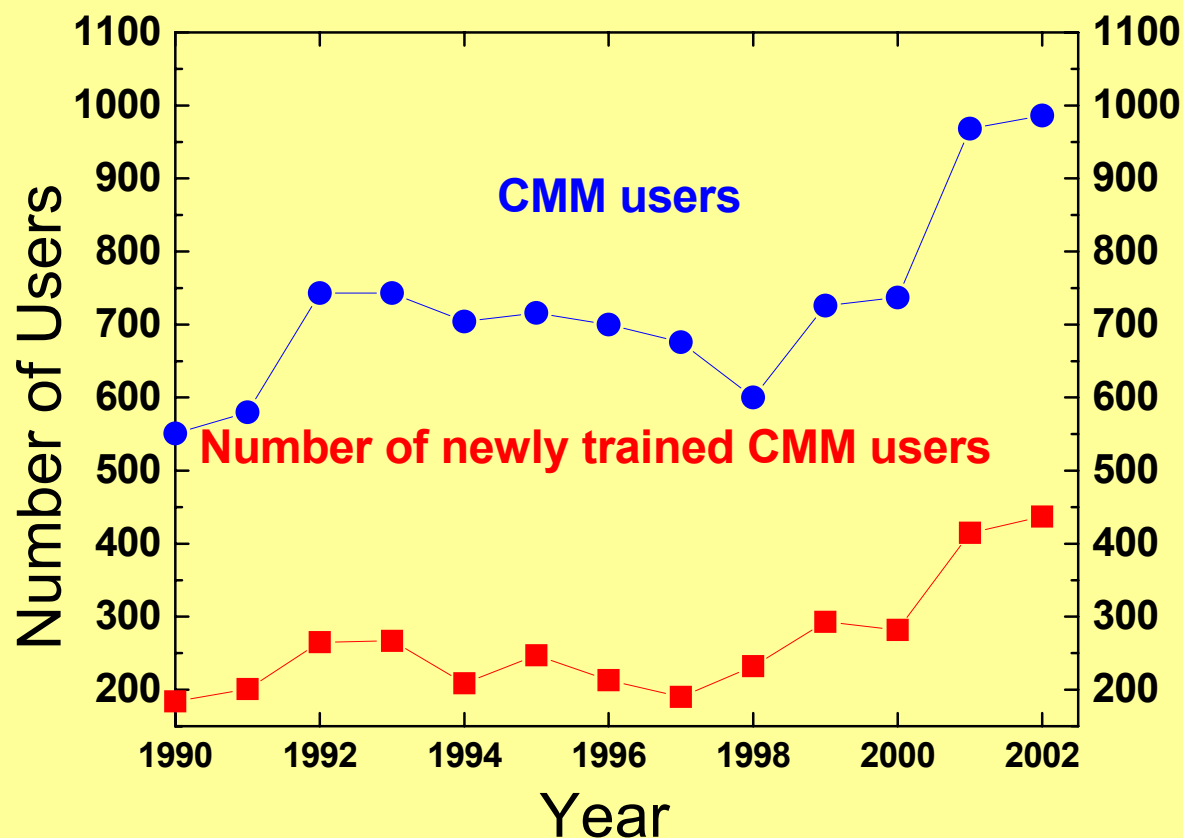
➤ Accessibility:

Open to internal and external users. Some techniques can be used on-line as well as on-site. Staff are available on-site and through the internet



Frederick Seitz Materials Research Laboratory Center for Microanalysis of Materials (CMM)

CMM is the single largest producer of scientists educated in nano-characterization techniques.



Why use CINT?

What will make CINT a unique center, whose existence is crucial to addressing new challenges in nanoscale characterization?

1. What do the **you** (the users of CINT) **Want and Need** ?
2. What will make **you** come to CINT?
3. What will make LANL and SNL scientists want to work with **you**, the outside users?
4. **How about Experimental Workshops, along the line of KITP Theoretical workshops?** (Bring together groups of scientists, over weeks, to work with the CINT facilities on a common problem.) **Would you be a co-PI on such a proposal?**

Your input is crucial in this early stage